

No. 2.— *The Australian Ants of the Genus Onychomyrmex.*

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Twenty years ago Emery described a singular ponerine ant taken by Podenzana on Mt. Bellenden-Ker, in Queensland, as the type of a new genus under the name of *Onychomyrmex hedleyi*, in honor of Mr. C. Hedley, a distinguished Australian naturalist. The worker, which was the only phase seen by Emery, exhibited an unusual combination of characters, especially in the shape of the mandibles, clypeus, petiole, and middle and hind tarsi, the terminal joints, pulvilli, and claws of which were conspicuously enlarged. He regarded the affinities of the genus as obscure. "Its mandibles and petiole," he says, "recall the species of *Amblyopone* and related genera, but the frontal carinae, approximated and dilated in front, resemble those of *Ponera* and *Leptogenys*. The tibiae without spurs are not found in any other Ponerinae. The tarsi, with their enormous claws and pulvilli, have no analogue, to my knowledge, except in the Dorylinae (*Aenictus*, *Anomma*), but the insertions of the antennae and the structure of the thorax lead me to think that these resemblances do not indicate a true relationship." Ashmead (Can. ent., 1905, 37, p. 382) regarded the genus *Onychomyrmex* as constituting a distinct tribe of Ponerinae (*Onychomyrmicini*). In his recent revision of the subfamily in the "Genera Insectorum" (1911), Emery adopts Ashmead's name as that of a sixth and last subtribe in the tribe Ponerini.

While collecting in the rich tropical "scrub" in the neighborhood of Kuranda, Queensland during the autumn of 1914, I succeeded in finding not only *O. hedleyi*, which had not been recorded for nearly twenty years, but also two additional species of the genus. On returning to Boston I learned that Dr. E. Mjöberg had anticipated me in finding *O. hedleyi* and one of the other species, while he was collecting for the Swedish scientific expedition to Australia during 1910-1913 and that Forel had just described the latter as *O. mjobergi*. The third species is described in the following pages as *O. doddi*, in

honor of Mr. F. P. Dodd, the well-known observer and collector of Queensland insects. I was so fortunate as to discover the females of *mjöbergi* and *doddi* and the larva of the former species. The female Onychomyrmex is of such an unusual type that it seems advisable to revise the genus in such a way that some of my Australian friends may be able to recognize all the known species at a glance and to make additions to our knowledge concerning their habits.

Unfortunately the male Onychomyrmex is still unknown and will have to be found before the precise status of the genus in the sub-family Ponerinae can be ascertained. Forel does, indeed, describe a male ponerine taken by Mjöberg as that of *O. hedleyi*, but he says that he does this "with a very great interrogation point." He has, in fact, no evidence that the specimen is an Onychomyrmex, except the very inconclusive fact that it was taken in the same locality (Malanda, Queensland) as the worker of *hedleyi*. I deem it advisable, therefore, to assume that the male is unknown till it is actually taken in nests with the workers. Such observations as I was able to make on the habits of the three species of Onychomyrmex are recorded below in connection with the taxonomic descriptions. So far as at present known all the species of the genus are confined to Queensland, and all live in red rotten logs in the tropical rain-forest ("scrub").<sup>1</sup>

#### ONYCHOMYRMEX Emery.

Emery, Ann. Soc. ent. Belg., 1895, 39, p. 349; Genera Insectorum, 1911, fasc. 118, p. 96; Forel, Arkiv. f. zoöl., 1915, 9, p. 2.

*Worker.* Small, slender, monomorphic. Mandibles rather long, narrow at the base, broadest in the middle, with long, curved, acute tips, their inner borders armed with a number of unequal teeth, some of which, near the middle of the series, are directed backward. Both the maxillary and labial palpi very short, 2-jointed. Clypeus very short, abrupt, with rounded, entire anterior border beset with a regular row of minute teeth. Frontal carinae small, prominent, closely approximated, enlarged and dilated anteriorly, separated by a very narrow groove. Frontal groove lacking. Eyes very small, consisting of about 6 or 8 ommatidia, situated behind the middle of the head.

<sup>1</sup> Emery believed that the *Anommæ erratica* of Frederick Smith from New Guinea might be an Onychomyrmex, but the description mentions none of the distinctive characters of this genus and was, perhaps, drawn from an Aenictus.

Antennae 12-jointed, funiculus filiform, not clavate or conspicuously enlarged at the tip. Thorax slender, with very distinct promesonotal and mesoepinotal sutures; mesonotum small, discoidal, with distinct sutures on all sides. Petiole with a short peduncle in front and a large, prominent compressed ventral projection, the node rounded, scarcely narrowed behind where it articulates by means of its whole posterior surface with the postpetiole. Postpetiole large, convex below, separated by a pronounced constriction from the gaster, which is rather short. Sting very long and well-developed. Legs long; middle and hind tibiae without spurs; terminal joints of the middle and hind tarsi conspicuously elongated and incrassated, with very large, strongly curved, simple claws and large pulvilli.

*Female.* Apterous and ergatomorphic. Head broadened in front and more depressed at the anterior corners than in the worker. Eyes very small; ocelli absent. Mandibles more falcate, not abruptly curved at the tips, with only a few short, blunt teeth. Mesonotum somewhat longer than in the worker. Petiole differing from that of the worker in being much broader, with a very short and narrow peduncle and lacking the ventral projection. Constriction between the postpetiole and gaster much less distinct than in the worker. Gaster much larger, elongate elliptical, sting somewhat smaller. In other respects like the worker.

*Larva.* Slender, smooth and nontuberculate, with twelve very distinct postcephalic segments, the constrictions between which are everywhere deep and conspicuous, even at the posterior end of the body. Head short, rounded, with well-developed, slender, acute, falcate mandibles, destitute of teeth. Clypeus rather long, projecting. Antennae very small. Maxillary sensillae long and prominent. Head sparsely, remainder of body more densely and uniformly covered with short, straight, stiff hairs or bristles.

Genotype: *Onychomyrmex hedleyi* Emery.

The discovery of the ergatoid female of *Onychomyrmex* only adds to our perplexity in regard to the precise taxonomic position of the genus. Similar females are known to occur in a few other ponerine genera, notably in *Acanthostichus*, *Paranomopone*, which I recently described from Queensland, and *Leptogenys* (subgenus *Lobopelta*), but all of these, together with *Onychomyrmex*, belong to very different sections of the subfamily, and the resemblances between them seem to be due to "convergence" and not to morphological relationship, or common phylogenetic development. The thorax of the female has simply assumed the structure of that of the worker, while the

gaster is greatly expanded to accommodate the voluminous ovaries. On closer examination it is found that in each of the four genera mentioned the female differs from the congeneric worker in certain peculiar characters. This will best be seen by a comparison of the worker and female *Lobopelta* with the corresponding phases of *Onychomyrmex*. Many years ago I called attention to the fact that the female *Lobopelta elongata* Buckley of Texas has no winged female, but that each colony contains a single egg-producing individual, which agrees in all respects with the worker, except in the larger size of the abdomen and the somewhat more compressed petiolar scale. While at Kuranda I succeeded in finding two females of another species (*Leptogenys* (*Lobopelta*) *fallax* Mayr subsp. *fortis* Forel), a small-eyed form which lives, like the species of *Onychomyrmex*, in red rotten logs in the primeval rain-forest. One of these females was the mother of a flourishing colony of perhaps 300 workers, the other was isolated in a small cavity in a large log and was, therefore, about to start a colony. I have figured one of the specimens (Plate 2, fig. 8, 9), with the worker (fig. 6, 7) to show the difference between them (in this case greater than those obtaining between the female and worker of *Lobopelta elongata*) and between the corresponding phases of *Onychomyrmex mjobergi* and *doddi* (Plate 1, fig. 3-6; Plate 2, fig. 3-5). It will be seen that in the *Lobopelta* female the petiole is very much more compressed and more curved forward than in the worker, the thorax more convex and furnished with a small scutellar sclerite and that the head is more orbicular and less rectangular and has distinctly larger eyes and a single ocellus. In the female *Onychomyrmex* the eyes are not larger than in the worker, there are no traces of ocelli, the head is dilated anteriorly, with rather straight, posteriorly converging sides, and with very different mandibles, while the petiole exhibits a peculiar modification as compared with that of *Lobopelta*, being greatly swollen behind and much contracted in front. The female *Acanthostichus* differs from the worker, according to Emery, in its rounded head, larger eyes, the presence of three ocellar pits, more widely separated frontal carinae, broader thorax, much larger abdomen, the absence of prickles on the sides of the pygidium, and a different pubescence on the abdomen. The only external differences between the female and worker *Paranomopone* are the presence of a median ocellus in the former and a larger postpetiole and gaster. These comparisons all point to the conclusion that in each of the four genera ergatomorphic females have been developed independently by simplification, or atrophy from the primitively winged type of female during

the long phylogenetic history of the ponerine subfamily. It is also probable that the very similar "dichthadiiform" females of the ants belonging to the subfamily Dorylinae have had a like independent origin and development.

The larva of *Onychomyrmex* (Plate 1, fig. 7; Plate 2, fig. 1, 2), in the very distinct segmentation of the body and in the structure of the head, seems to be of a rather primitive type and resembles the larvae of the Dorylinae (*Eciton*) and lower Ponerinae (*Acanthostichus*, *Cerapachys*), but the larvae of ants have not been sufficiently studied to enable us to draw satisfactory conclusions concerning the phylogenetic relationships of the various genera.

A study of the worker *Onychomyrmex* certainly reveals a number of highly specialized characters. Such are particularly the shape of the mandibles, the vestigial condition of the palpi, the small size of the eyes, and the enlargement of the terminal joint, claws, and pulvilli of the middle and hind tarsi. The degenerate visual organs show that these ants belong to the hypogaecic series and that they pass their lives concealed in the logs which gradually decompose in the moist shade of the dense tropical jungle. The powerful, toothed mandibles, long stinging and great hooked claws indicate that their possessors do not feed habitually on small feeble insects like termites, but on much larger creatures such as the larvae of passalids and scarabaeids and possibly on adult myriopods and scorpions. This I found to be the case in a colony of *O. mjobergi*, for when the log containing it was broken open, many of the workers were detected in the act of biting and stinging to death a huge lamellicorn beetle larva more than two inches in length, which they had just found in a cavity in the wood. It is not improbable that the colonies move from place to place in search of their prey, like the colonies of the subterranean Dorylinae (*Eciton coecum* and *Dorylus*), which they very closely resemble in behavior, color, sculpture, and pilosity.

The species of *Onychomyrmex* are far from common even in Queensland, and the few colonies I secured were the reward of many hours of search and of the destruction of many old logs in places where I was frequently attacked by land-leeches and saw quite a number of the deadly black snakes (*Pseudechis porphyriacus*). Perhaps it would be possible for the collector to attract colonies by placing large beetle or cossid larvae in holes in the rotten logs usually found along the paths through the "scrub."

## ONYCHOMYRMEX HEDLEYI Emery.

Plate 1, fig. 1, 2.

Emery, Ann. Soc. ent. Belg., 39, 1895, p. 350, f. 2. ♀; Gen. Insect., 1911, fasc. 118, p. 97, pl. 3, f. 9, 9b; Forel, Arkiv. f. zool., 1915, 9, p. 3, pl. 1, f. 3 ♀ ♂ (?).

*Worker.* Length 3.5–4 mm.

Head about  $1\frac{1}{4}$  times as long as broad, subrectangular, a little broader in front than behind, with straight sides and posterior border and rounded posterior corners. Clypeus with the anterior border slightly flattened, arcuately rounded in the middle, sinuate at the sides, its edge beset with about 20 minute, regular teeth. Eyes with about 6–8 minute ommatidia, situated  $\frac{3}{5}$  the length of the head from the anterior margin. Mandibles with long, abruptly incurved apical tooth and seven basal teeth of different sizes, the two in the middle of the series largest and directed backward. Antennae slender, scapes fully  $\frac{4}{5}$  as long as the head, first and last funicular joints twice as long as broad, remaining joints about  $1\frac{1}{2}$  times as long as broad. Thoracic sutures all strongly impressed; pronotum convex above, especially in front, with convex sides, a little longer than broad; mesonotum nearly twice as broad as long; epinotum longer and narrower than the pronotum, longer than broad, with feebly convex sides and separated in dorsal view from the pronotum by a pronounced impression on each side. In profile the thorax is distinctly impressed at the mesonotum, the base of the epinotum is nearly twice as long as the straight declivity into which it passes through an obtuse angle. Node of petiole in profile with rather straight anterior slope and convex summit, slightly concave at the posterior border; from above the node is as long as broad, rounded in front, with straight posterior border; ventral projection long and blunt, compressed and somewhat translucent. Postpetiole as long as broad, first gastric segment a little longer than the postpetiole. Legs slender.

Very smooth and shining; mandibles, clypeus, and cheeks subopaque, the mandibles finely striated, the clypeus and cheeks finely rugulose-punctate. Body with fine, sparse, piligerous punctures, which are most numerous on the head, especially on its sides.

Hairs delicate, pale yellowish, short, suberect, covering not only the whole body, legs, and antennal scapes but also the funiculi;

somewhat longer and sparser on the thorax, abdomen, and legs than on the head and antennae.

Black; thoracic sutures, sides and terminal segments of abdomen, clypeus, cheeks, and anterior portion of gula reddish castaneous, mandibles, except their teeth, antennae, and legs paler, brownish red, middle portions of femora and tibiae more or less infuscated.

*Queensland*: Mt. Bellenden-Ker, type locality (Podenzana); Malanda (E. Mjöberg); Kuranda (Wheeler and F. P. Dodd).

I took two small companies of this ant, unaccompanied by larvae or females, Oct. 24 and 28, evidently on foraging expeditions in the heart of rotten logs. One of the companies comprised a dozen, the other about two dozen workers. Later Mr. Dodd sent me eight workers which he had taken in the same locality. The ants moved rather slowly and were easily captured.

#### ONYCHOMYRMEX MJÖBERGI Forel.

Plate 1, fig. 3-7; Plate 2, fig. 1, 2.

Forel, Arkiv. f. Zool., 1915, 9, p. 5, pl. 1, f. 7; text fig. 1, ♀.

*Worker*. Length 3.5-4 mm.

Head subrectangular, not more than  $\frac{1}{6}$  longer than broad, scarcely broader in front than behind, with feebly and evenly convex sides, feebly concave posterior border and rounded posterior corners. Clypeus with broadly arcuate anterior border, sinuate on each side, minutely and evenly denticulate. Eyes scarcely smaller than in *hedleyi*, situated about  $\frac{2}{3}$  the distance from the anterior to the posterior border of the head. Mandibles similar to those of *hedleyi*. Antennae shorter, scapes only  $\frac{2}{3}$  as long as the head, first and last funicular joints nearly twice as long as broad, remaining joints not longer than broad, the more basal joints a little broader than long. Thorax differing from that of *hedleyi* in being stouter and in having the dorsal outline nearly straight in profile, the pronotum being convex only at the extreme anterior end and the mesonotum less impressed. Thoracic sutures very distinct but less impressed than in *hedleyi*. Mesonotum fully three times as broad as long. Petiole with very short peduncle, anterior surface of node more concave, its upper surface seen from above distinctly broader than long, with very convex sides. Constriction between the postpetiole and gaster somewhat deeper than in *hedleyi*, legs stouter.



Smooth and shining; mandibles shining, not striate but sparsely punctate, like the remainder of the body. Punctures on the head coarser than in *hedleyi*, and more abundant, especially on the cheeks and sides of the front. Clypeus subopaque, rugulose-punctate.

Hairs similar to those of *hedleyi* but coarser and of rather uneven length, pale yellow.

Rich ferruginous red, clypeus darker; tarsal claws, sutures of thorax and gaster, articulations of antennal funiculi dark brown, mandibular teeth black; legs and anal segments of gaster paler and more yellowish.

*Female.* Length nearly 5.5 mm.

Head a little longer than broad and nearly as broad in front as long, with prominent, depressed anterior corners, the sides converging posteriorly, with two transverse impressions, one half-way between the anterior corner and the eye and one at the eye. Eyes as small as in the worker, but more elongate. Mandibles with less abruptly incurved tips than in the worker and with only two indistinct teeth. Thorax more robust than in the worker, the pro- and epinotum with more convex sides and the pronotum more convex above, so that the mesonotum is more impressed in profile. From above the mesonotum is scarcely twice as broad as long. Petiole much larger than in the worker, with very short, slender peduncle, without ventral projection; node large, very convex in front, from above more than twice as broad as long, broader than the epinotum and nearly half as broad as the postpetiole. Gaster very much larger than in the worker, more than twice as long as broad, suboblong, flattened dorsoventrally.

Sculpture as in the worker, but the piligerous punctures, especially on the head, much coarser, almost foveolate and somewhat elongated on the sides of the front. Cheeks and sides of epinotum subopaque, finely rugulose-punctate.

Hairs coarser and longer, especially on the body, than in the worker.

Color more brownish ferruginous; mandibles, antennae, and legs more yellowish; pleurae, sides of petiole, and sutures of gaster brownish yellow.

*Queensland:* Herberton (type locality), Atherton and Cedar Creek (E. Mjöberg); Kuranda (Wheeler).

October 24, I found two fine colonies of this species in rotten logs. One comprised at least 400 workers, a single queen, with the abdomen greatly distended with eggs, and a large number of nearly mature larvae but no pupae. The other colony was somewhat less populous but also contained many larvae. The ants moved rather slowly in long files through the cracks in the wood, evidently endeavoring to



keep in close touch with one another by means of their antennae, after the manner of the Dorylinae. They stung severely for such small insects.

The worker of *O. mjöbergi* is readily distinguished from that of *hedleyi* by its paler color, shorter head, antennal scapes and funicular joints, the straight dorsal profile of the thorax, broader epinotum and petiole, deeper constriction between the postpetiole and gaster, and smooth, shining, and sparsely punctate mandibles.

ONYCHOMYRMEX DODDI, sp. nov.

Plate 2, fig. 3-5.

*Worker.* Length: 2-2.5 mm.

Head subrectangular, about  $\frac{1}{5}$  longer than broad, scarcely broader in front than behind, with nearly straight lateral and posterior borders and rounded posterior corners. Clypeus with broadly arcuate, finely denticulate anterior border, sinuate on the sides. Eyes very similar to those of the preceding species, situated about  $\frac{3}{5}$  the distance from the anterior to the posterior border of the head. Mandibles with the long terminal tooth less abruptly bent inward, remaining teeth rather small. Antennal scapes  $\frac{3}{4}$  as long as the head; first and terminal funicular joints fully twice as long as broad, remaining joints scarcely longer than broad. Thorax rather stout, shaped much as in *mjöbergi*, with straight, horizontal dorsal outline, the pronotum longer than broad, rising rather abruptly from the neck, but posteriorly flattened above, its sides only feebly convex. Mesonotum somewhat more than twice as broad as long. Thoracic sutures very distinct. Epinotum in profile with the base feebly and evenly convex and longer than the declivity which is sloping and distinctly concave. Petiole in profile with a short basal peduncle and prominent, compressed, somewhat translucent ventral projection; the node with subequal anterior and dorsal surfaces, both feebly convex; seen from above as long as broad, subrectangular, with rounded sides and straight, subequal anterior and posterior borders. Postpetiole as long as broad, very convex below and separated by a pronounced constriction from the gaster. Legs as in *mjöbergi*.

Smooth and shining, covered with small piligerous punctures, which are most abundant on the head and especially on the cheeks. Mandibles, clypeus, and cheeks opaque, the mandibles finely and sharply

striate and sparsely punctate, the clypeus densely transversely rugulose.

Pilosity pale yellow, much as in *hedleyi* but shorter.

Color also like that of *hedleyi*, deep castaneous, nearly black; mandibles, except the teeth, clypeus, and frontal carinae deep brownish red; antennae, legs, and tip of gaster yellowish brown; coxae and middle portions of femora and tibiae darker.

*Female.* Length nearly 4 mm.

Resembling the female of *mjöbergi* in form, but the head is proportionally broader behind and without lateral impressions; differing from the worker in the shape of the head, which is broadened in front, the feebly dentate, less curved mandibles and the stouter thorax and larger petiole, postpetiole, and gaster. The sides and dorsal surface of the pro- and epinotum are more convex than in the worker and the promesonotal and mesoëpinotal sutures are more impressed so that the dorsal outline is much less straight and continuous. Mesonotum not more than twice as broad as long. Petiole like that of the female *mjöbergi*, the peduncle very small, the node very large, convex and rounded in front and on the sides, with straight posterior border; seen from above it is only a little more than  $1\frac{1}{2}$  times as broad as long, scarcely broader than the epinotum and more than half as broad as the postpetiole. The latter is separated by a very slight constriction from the gaster, which is large and shaped much as in the female *mjöbergi*.

Sculpture and color as in the worker, hairs considerably longer and coarser, especially on the postpetiole and gaster.

*Queensland:* Kuranda (Wheeler).

I found only one colony of this ant (November 1), consisting of a female and nearly 50 workers, but without larvae, in a small log in a damp, shady spot in the dense "scrub."

The worker is readily distinguished from both *hedleyi* and *mjöbergi* by its smaller size and less abruptly curved mandibles; from *mjöbergi* by its color, longer head, striated mandibles and finer pilosity; from *hedleyi* by the straight dorsal outline of the thorax and less convex pronotum, shorter petiole, scapes, and funicular joints.